



RESEARCH ARTICLE

DESIGN OF HIGH-ACCURACY FIXED-WIDTH MODIFIED BOOTH MULTIPLIER

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Abstract: The fixed-width multiplier is attractive to many multimedia and digital signal processing systems which are desirable to maintain a fixed format and allow a little accuracy loss to output data. This paper presents the design of high-accuracy fixed-width modified Booth multipliers. To reduce the truncation error, we first slightly modify the partial product matrix of Booth multiplication and then derive an effective error compensation function that makes the error distribution be more symmetric to and centralized in the error equal to zero, leading the fixed-width modified Booth multiplier to very small mean and mean-square errors. In addition, a simple compensation circuit mainly composed of the simplified sorting network is also proposed. Compared to the previous circuits, the proposed error compensation circuit can achieve a tiny mean error and a significant reduction in mean-square error while maintaining the approximate hardware overhead.

Keywords - Modified Booth Multiplier, Booth Encoder, partial product, CSA, Signed-unsigned

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